

## REGIONAL COMPETITION - ROUND 5

### TOSS-UP

1. **GENR; Short Answer:** Recently it has been observed that the stratospheric ozone layer is thinning. What part of the sun's radiation does the ozone layer prevent from penetrating to the surface of the earth?

**ANSWER: ULTRAVIOLET LIGHT**

### BONUS

1. **GENR; Short Answer:** What is now located at the site of the ancient volcano Mt. Mazama?

**ANSWER: CRATER LAKE (OREGON)**

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### TOSS-UP

2. **PHYS; Multiple Choice:** Which of the following materials has the highest coefficient of thermal expansion?

- a) oak
- b) iron
- c) copper
- d) porcelain

**ANSWER: C--COPPER**

### BONUS

2. **PHYS; Multiple Choice:** Which of the following parameters always remains constant as a light ray moves from one medium to another?

- a) frequency
- b) velocity
- c) wavelength
- d) amplitude

**ANSWER: A--FREQUENCY**

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**TOSS-UP**

3. **BIOL; Multiple Choice:** Rising levels of carbon dioxide are leading to the possibility of global warming. Which of the following is a potential benefit of increased carbon dioxide levels:
- a) melting of the polar ice caps
  - b) increased global temperatures
  - c) increased plant productivity
  - d) increased respiratory rates in animals

**ANSWER: C--INCREASED PLANT PRODUCTIVITY**

**BONUS**

3. **BIOL; Short Answer:** What African animal (besides man) kills the most people?

**ANSWER: THE CROCODILE**

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**TOSS-UP**

4. **ASTR; Multiple Choice:** Scientists have recently been able to determine the ratio of Pluto's mass to that of its moon, Charon. Since they already knew the diameters of each object, they could calculate the density of Charon. They have concluded that it is mostly:
- a) frozen methane
  - b) ice
  - c) granite
  - d) frozen carbon dioxide

**ANSWER: B--ICE**

**BONUS**

4. **ASTR; Multiple Choice:** Recent data from the COBE satellite have enabled scientists to show that the energy spectrum of the cosmic microwave background is extremely close to that of a perfect black body at what absolute temperature?
- a) 0.3 Kelvin (K)
  - b) 2.7 Kelvin (K)
  - c) 5.5 Kelvin (K)
  - d) 13.6 Kelvin (K)

**ANSWER: B--2.7 KELVIN (K)**

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**TOSS-UP**

5. **CHEM; Short Answer: What is the full name of the solvent DMSO?**

**ANSWER: DIMETHYL SULFOXIDE**

**BONUS**

5. **CHEM: Short Answer: When cream of tartar and baking powder are added to flour and warm water to make bread, what gas is evolved to cause the bread to rise?**

**ANSWER: CARBON DIOXIDE**

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**TOSS UP**

6. **COMP; Multiple Choice: A difference between PASCAL and FORTRAN is:**
- a) you cannot write recursive procedures in PASCAL, you can in FORTRAN
  - b) FORTRAN uses dynamic memory allocation, PASCAL does not
  - c) PASCAL includes the RECORD data type, FORTRAN does not
  - d) both b and c

**ANSWER: C--PASCAL INCLUDES THE RECORD DATA TYPE, FORTRAN DOES NOT**

**BONUS**

6. **COMP; Multiple Choice: The most appropriate language for writing an Artificial Intelligence application would be:**
- a) COBOL
  - b) BASIC
  - c) FORTRAN
  - d) LISP

**ANSWER: D--LISP**

**TOSS-UP**

7. BIOL; Short Answer: What endangered animal is the symbol of the World Wildlife Fund?

**ANSWER: THE GIANT PANDA**

**BONUS**

7. BIOL; Short Answer: Cancer may be defined as a progressive series of genetic changes in a group of cells. The genes whose change leads to cancer are known as what?

**ANSWER: ONCOGENES or TUMOR SUPPRESSOR GENES**

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**TOSS-UP**

8. PHYS; Multiple Choice: One gram centimeter per second squared equals:

- a) one watt
- b) one pascal
- c) one erg
- d) one dyne

**ANSWER: D--ONE DYNE**

**BONUS**

8. PHYS; Multiple Choice: Element A is radioactive and decays to element B, which in turn decays to element C. The half life of A is very much larger than that of B, and the half life of B is approximately the same as that of C. When all three elements have reached secular equilibrium, Element B will decrease with:

- a) The half life of element A
- b) The half life of element B
- c) The half life of element C
- d) The average of the half-lives of A and B

**ANSWER: A--THE HALF LIFE OF ELEMENT A**

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**TOSS-UP**

9. **ERSC; Multiple Choice:** Which of the following types of rock is **LEAST** susceptible to chemical weathering?
- a) granite
  - b) basalt
  - c) marble
  - d) limestone

**ANSWER: A--GRANITE**

**BONUS**

9. **ERSC; Short Answer:** What do the following types of rock have in common? Marble, gneiss, slate, and schist?

**ANSWER: THEY ARE ALL METAMORPHIC ROCKS.**

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**TOSS-UP**

10. **CHEM: Short Answer:** Name the temperature scale on which water freezes at 0 degrees and boils at 80 degrees.

**ANSWER: REAUMUR**

**BONUS**

10. **CHEM: Short Answer:** What is the boiling point of water on the Rankine scale?

**ANSWER: 672 DEGREES**

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**TOSS-UP**

11. **BIOL; Short Answer:** How many front toes does a parrot have?

**ANSWER: TWO**

**BONUS**

11. **BIOL; Short Answer:** What is the only bird that gives us leather?

**ANSWER: THE OSTRICH**

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**TOSS-UP**

12. **CHEM: Short Answer:** What alkali metal gives off the red light in fire works?

**ANSWER: LITHIUM**

**BONUS**

12. **CHEM: Multiple Choice:** If two different gases have the same volume, temperature, and pressure and behave like real gases, they will also have the same:

- a) average molecular velocity
- b) total mass
- c) total molecular kinetic energy
- d) average momentum per molecule

**ANSWER: C--TOTAL MOLECULAR KINETIC ENERGY**

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**TOSS-UP**

13. **MATH; Short Answer:** If you have an ordinary dime which you have tossed nine times with the result that you have 6 heads and 3 tails, what is the probability that the tenth toss will be heads?

**ANSWER: ONE-HALF (ACCEPT 0.5 OR ONE OUT OF TWO)**

**BONUS**

13. **MATH; Short Answer:** What is the logarithm to the base 8 of 1?

**ANSWER: 0 (ZERO)**

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**TOSS-UP**

14. **GENR; Multiple Choice:** The terms "color", "top", and "bottom" might arise during a discussion of:
- a) Cellular structure in microbiology
  - b) Particle physics
  - c) High-energy astrophysics
  - d) Number theory in mathematics

**ANSWER: B--PARTICLE PHYSICS**

**BONUS**

14. **GENR; Short Answer:** What is the linear relationship called of a plot of deuterium versus oxygen-18 for water found in continental precipitation?

**ANSWER: THE METEROIC WATER LINE**



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**TOSS-UP**

15. **BIOL; Short Answer: What is the largest cat native to the Americas?**

**ANSWER: THE JAGUAR**

**BONUS**

15. **BIOL; Short Answer: What is distinctive about a palmiped's feet?**

**ANSWER: THEY ARE WEBBED**

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**TOSS-UP**

16. **ASTR; Short Answer: Ten radiotelescopes have recently been installed at locations ranging from Hawaii to the Virgin Islands. The signals are all linked together to give the equivalent of one telescope with a diameter of 8000 km. The name of this system is VLBA (pronounced V-L-B-A) which means:**

**ANSWER: VERY LONG BASELINE ARRAY**

**BONUS**

16. **ASTR; Multiple Choice: How far is the closest known pulsar, PSR J0437-4715 from earth?**
- a) 4 light years
  - b) 40 light years
  - c) 400 light years
  - d) 4000 light years

**ANSWER: C--400 LIGHT YEARS**

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**TOSS-UP**

17. **PHYS: Short Answer:** What is the equivalent capacitance of a parallel combination of a 2 microfarad capacitor and a 3 microfarad capacitor?

**ANSWER: 5 MICROFARADS**

**BONUS**

17. **PHYS: Short Answer:** You are working on a simple electronic device which requires a  $\frac{2}{3}$  ohm resistor. You have 1, 2, 3, 4, and 5 ohm resistors but don't have a  $\frac{2}{3}$  ohm resistor. You can wire the 2 ohm resistor plus another of the resistors in parallel to yield the  $\frac{2}{3}$  ohm resistance. Which resistor is it?

**ANSWER: A--1 OHM**

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**TOSS-UP**

18. **CHEM: Short Answer:** What chemical was used as fuel for the rocket engine in the Lunar Lander?

**ANSWER: HYDRAZINE (N<sub>2</sub>H<sub>4</sub>)**

**BONUS**

18. **CHEM: Short Answer:** Name the 19th Century Chemist who perfected the soft drink "Dr. Pepper":

**ANSWER: R.S. LAZENBY**

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**TOSS-UP**

19. **ERSC; Multiple Choice:** Which of the following types of rock is most likely to form a highly productive aquifer?
- a) shale
  - b) schist
  - c) sandstone
  - d) granite

**ANSWER: C--SANDSTONE**

**BONUS**

19. **ERSC; Multiple Choice:** Nitrate contamination of groundwater is commonly caused by:
- a) fertilizers and septic tanks
  - b) toxic waste landfills
  - c) leaking underground fuel tanks
  - d) acid mine drainage

**ANSWER: A--FERTILIZERS AND SEPTIC TANKS**

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**TOSS-UP**

20. **COMP; Multiple Choice:** The difference between global and local variables is most closely related to:
- a) the scope over which they are defined
  - b) the amount of memory required to store their variables
  - c) the set of valid values the variables can assume
  - d) their relationship to data stored in disk files

**ANSWER: A--THE SCOPE OVER WHICH THEY ARE DEFINED**

**BONUS**

20. **COMP; Multiple Choice:** "Lexical analysis" is one part of the process carried out by:
- a) a linker
  - b) a compiler
  - c) a DMA controller
  - d) a neural network algorithm

**ANSWER: B--A COMPILER**

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**TOSS-UP**

21. BIOL; Short Answer: What sense is most closely linked to memory?

**ANSWER: SMELL**

**BONUS**

21. BIOL; Short Answer: What kind of animal is a nanook in the Eskimo tongue?

**ANSWER: THE POLAR BEAR**

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**TOSS-UP**

22. MATH; Short Answer: Consider a square. What is the ratio of the area of a circle circumscribed around it to the area of a circle inscribed within it?

**ANSWER: 2:1**

**BONUS**

22. MATH; Multiple Choice: You are dealt 2 cards from a normal deck of 52 cards. The probability of being dealt 2 aces is:

- a) 1 in 100
- b) 1 in 200
- c) 1 in 500
- d) 1 in 1000

**ANSWER: B -- 1 IN 200**

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**TOSS-UP**

23. **PHYS; Multiple Choice:** Scientists and mathematicians are seeking a unified theory; this would unify the concepts embodied by :
- a) quarks and quasars
  - b) Genesis and evolution
  - c) quantum theory and relativity
  - d) genetics versus environment

**ANSWER: C--QUANTUM THEORY AND RELATIVITY**

**BONUS**

23. **PHYS; Multiple Choice:** A ham radio operator broadcasts at a frequency of 15 MHz. What is the wavelength of the radio waves put out by the transmitter?
- a) 5 m
  - b) 20 m
  - c) 25 m
  - d) 45 m

**ANSWER: B--20 M**

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**TOSS-UP**

24. **CHEM: Short Answer:** What was the first synthetic insecticide?

**ANSWER: DDT**

**BONUS**

24. **CHEM: Short Answer:** By what name is Theophrastus Bombastus von Hoenheim better known?

**ANSWER: PARACELSUS**

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### TOSS-UP

25. **PHYS; Multiple Choice:** There are two balls, one of mass  $m$  at height  $x$  and the other of mass  $2m$  at height  $2x$ . If both balls are released at the same time with initial velocity equal to zero, ball 1 of mass  $m$  takes  $t$  seconds to strike the ground. When will the ball of mass  $2m$  hit the ground?
- a) at  $t$  seconds.
  - b) at less than  $t$  seconds.
  - c) at  $2t$  seconds.
  - d) at less than  $2t$  seconds but greater than  $t$  seconds.

**ANSWER: D--AT LESS THAN 2T SECONDS BUT GREATER THAN T SECONDS**

### BONUS

25. **PHYS; Multiple Choice:** A body moving with simple harmonic motion has maximum acceleration when it has:
- a) maximum velocity
  - b) minimum kinetic energy
  - c) minimum potential energy
  - d) maximum kinetic energy

**ANSWER: B--MINIMUM KINETIC ENERGY (Physics for Scientists and Engineers, Tipler, 1991)**

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